

ROSENTHAL (ED.)

A REPORT OF A SERIES OF CASES OF LARYN-
GEAL DIPHTHERIA TREATED WITH
THE ANTITOXIN, WITH AND
WITHOUT INTUBATION.

BY

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OF PHILADELPHIA.



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**A REPORT OF A SERIES OF CASES OF LARYN-
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THE various historical discoveries in bacteriology that have led to the serum-treatment of diphtheria are now well known and are the common property of the medical world. I am a firm believer in the doctrines of the new pathology, and as such have had no fear in practically applying them.

The immunity of individuals against disease is understood to depend upon the destruction by certain agents of the supposed living cause of the disease. These agents may also act by hindering the growth of the living cause; by destroying its infectious properties; by the destruction of the poisonous material produced in the infected organism; or by imparting a higher degree of resisting power against the action of this poisonous material.

In April, 1893, Behring and Kossel published the results obtained in the treatment of thirty cases of diphtheria by the injection of so-called antitoxic serum. The serum was obtained from the blood of

¹ Read before the Pennsylvania State Medical Society, Chambersburg, May 23, 1895.



animals rendered immune to the disease by the prolonged injection of minute but gradually increasing quantities of diphtheria-toxin: a fluid obtained by the cultivation of diphtheric bacilli in nutrient broth. The success of the treatment according to Behring and Kossel was very remarkable, and other observers, notably Ehrlich, Wasserman, Roux, and now a host of others, have confirmed these results.

Independent clinical observations on the use of antitoxin have been made by myself in those cases only of diphtheria wherein the larynx was the site of the disease, and which may have necessitated intubation or not. I have had the very kind co-operation of my friends, Dr. H. H. Freund and Dr. L. Wolff. Their cases were published in *THE MEDICAL NEWS*, February 9 and March 2, 1895. In the bacteriologic examinations my friend, Dr. A. Klein, has lent his valuable services, and between us we have tested the antitoxin in other varieties of diphtheria, as well as its power of immunization.

Those familiar with diphtheria, especially with the laryngeal complications, know well its course and sequelæ, and, after having tried the various methods of treatment, they now make use of the antitoxin, and marvel at its peculiar specific action and at the results attained.

I report to-day twenty-two cases of laryngeal diphtheria, some of them complicated. Of this number, fourteen were females and eight males. Two died, a mortality of 9 per cent.

For analysis I divide these cases into two groups—those intubated and those not intubated. Of those not intubated—ten in number—I have no mortality

to record—all recovered. Of this group, seven were females and three were males. There were three between one and two years old, three between two and three years old, one between three and four years old, one between four and five years old, one between five and six years old, one between six and seven years old.

The average time required for the relief of stenosis in this group was three days. These cases responded more quickly to the antitoxin, though the fall in the temperature and pulse-rate was different from that cited in recorded cases—never under from thirty-six to forty-eight hours—and in other infections (pneumonia) it continued for a week or more.

Of those intubated—twelve in number—two died, a mortality of 16 per cent. Taking into consideration the average mortality of cases intubated without this method of treatment—72 per cent.—we can very well appreciate the difference.

My own statistics in a recent paper on one-hundred cases of intubation (*Medical Bulletin*, September and October, 1894) showed a mortality of 62 per cent. The average mortality in cases intubated and treated with the antitoxin shows a marvellous reduction in the death-rate. I refer to the statistics of Ehrlich, Wasserman, and H. Kossel, of Katz and Aronson, and of Roux, Martin, and Chailon. Of thirty cases of laryngeal diphtheria treated by H. Kossel at the Charité, Berlin, nineteen recovered—twelve without operation. The mortality with tracheotomy was 61 per cent. The cases, however, were seen late, and ten of the eleven

deaths were seen after five days, and were septic. I do not think Kossel practises intubation.

Of the cases intubated, five were males and seven were females. Of the males two died—one between one and two years old, and one between two and three years old. The ages were: four between one and two years old, four between two and three years old, one between three and four years old, one between four and five years old, one between five and six years old, one between six and seven years old.

The average time for the tube to remain in the larynx was four days. Of course, there are exceptions—one case needed the tube over twelve days. Such improvement as marked those cases not intubated was noticed in these, but to a slighter degree, and the temperature was not reduced until the third day. The pulse always remained high. When other infection (pneumonia) existed the temperature, pulse, and respiration remained extremely high for several days—even after all visual traces of the diphtheria had disappeared and the tube was withdrawn. When pneumonia came as a sequel the temperature rose to 106° , the pulse to 180, the respiration to 80. Under appropriate treatment these alarming symptoms disappeared and the patients recovered.

The after-treatment of those intubated was precisely the same as in those cases in which antitoxin had not been used. The room was kept at a suitable temperature, a large kettle with water, to which was added a considerable quantity of salt, was constantly boiling in the room, the air thereby being kept moist. The throat was kept clean with

a spray of hydrogen dioxid once in three or four hours, or the child was permitted to gargle with a solution of hydrogen dioxid or of boric acid. Food was given at stated intervals, not only such food as was generally thought proper, milk, beef-broth, and the like, but anything the child craved, such as ice-cream, bread, cake, coffee, candy, oranges, or the like ; nor were any bad effects noticed from this procedure, for all the cases recovered. It would appear strange that children with tubes in the larynx should find great difficulty in swallowing liquids, when bread, cakes, and the like, moistened in milk or coffee, were swallowed with the greatest ease.

In two cases, notably those of Dr. Metzler, difficulty was met with in giving a sufficient amount of nourishment. Recourse was had to rectal feeding, Dr. Metzler using a mixture of milk and egg, properly prepared, to which were added three drops of laudanum for each injection. Experience has taught me that under the antitoxin-treatment all stenosis should disappear on the third day ; for that reason all the tubes were withdrawn on the fourth day—if not previously removed by coughing—and were only reinserted if required ; this was only necessary in three cases when daily removals were practised.

The temperature and pulse-rate remain high in cases intubated ; but when this continued after the third or fourth day—probably due to streptococcus or pneumococcus infection—the tube was withdrawn anyhow and appropriate treatment was pursued.

As to the antitoxin used, most of my work was

done with Behring's antitoxin, of which I always had a constant supply—through the kindness of a relative, Geheim Sanitäts rath, Dr. A. Baer, of Berlin—though I have treated cases with the antitoxins of Aronson, Gibier, and McFarland, all cases recovering. I must acknowledge equal value to each, although that of Behring seemed to act more quickly and more decidedly, and has thus received more confidence from me.

As to the method of using, if the child was very young and weighed little, one bottle of Behring's No. 1 was injected in one dose. If any complications existed, as infection of the pharynx, tonsils, or lymphatics, a bottle of No. 2 was used in one injection. If, after twelve or twenty-four hours, improvement was noticed, no more antitoxin was used. But if the disease seemed to progress, or the symptoms became more urgent, another injection of No. 2 was given. Two injections sufficed to cure in the worst of my cases. My injections were all made in the back, to the one side or other of the spine, under the scapula. The parts were previously washed with alcohol, soaked upon sublimate cotton, and after injection the parts were sealed with iodoform collodion.

The indications for intubation are the same as in cases without the use of the antitoxin, with this exception: the earlier the antitoxin is used, the less need is there of intubation. However, urgent necessity—by reason of the membrane becoming loosened and thus causing suffocation—may require intubation at any moment; for the first twenty-four hours, therefore, constant visits, say, once in two

hours, may be required. When, however, the treatment is begun late, say on the fifth day of the disease, my rule or practice would be to intubate first, even before injection.

My conclusions drawn from the use of antitoxin are these :

The antitoxin is a specific in diphtheria. In early cases—those seen one or two days after infection—no death-rate should be recorded.

In laryngeal diphtheria the antitoxin is specially indicated. It should be used in every stage or date of the disease, no matter how late we see the case ; its influence can be proved, for cases of laryngeal diphtheria perish from suffocation long before any toxic symptoms could be manifested ; for that reason I would strongly urge the necessity of prompt intubation when indicated, even before the injection of the antitoxin is made.

In conclusion, I would emphatically reiterate that in early cases no death-rate should be recorded ; and for that reason would say : Do not delay or hesitate because the patient's condition is not so bad, or because he might get well anyhow, but use the antitoxin at once. The earlier its use the more certain its success.

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